INTERNATIONAL TRANSLATION CENTER, INC.

ITC

DECLARATION OF TRANSLATOR

I, Lawrence B. Hanlon, of the International Translation Center, Inc., do hereby avow and declare that I am conversant with the English and German languages and am a competent translator of German into English. I declare further that to the best of my knowledge and belief the following is a true and correct translation prepared and reviewed by me of the document in the German language attached hereto.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of any patent issued thereon.

Lawrence B. Hanlon

Lawrence B. Hanlon

Date: 09/17/03

1660 L STREET, N.W. • SUITE 613 • WASHINGTON, D.C. 20036 • TEL. (202) 296-1344

AJ145B-US

Structure, Especially a Slope-Supporting Structure and/or Noise-Barrier Structure

The invention pertains to a structure with the following features:
The structure comprises at least one essentially rigid supporting structure that is designed as a projection and has a plurality of support elements arranged one above the other in tiers (E), as well as at least one compound filler that consists at least partially of bonding-agent-free granulate material and/or bulk material and/or soil material; the supporting structure is equipped with at least one anchoring device, and preferably several such anchoring devices, that extend into the compound filler, whereby solid anchoring devices or anchoring devices with soft-flexible flat-material strips that extend into the compound filler can be provided.

Structures of this kind are known in numerous designs and implementations. The above-mentioned basic versions have the following in common:

High stability that is reliable over the long term while being highly economical to manufacture, as well as to maintain and care for. Further improvements over the known state of the art are still needed in order to meet this combination of requirements. The object of the invention is therefore to create advanced designs to meet the above-mentioned requirements.

The accomplishment of the object according to the invention is defined by the combination of features as described in Claims 1, 9 and 13. The dependent claims define advanced enhancements, some of which have their own inventive merit. In this connection, it is possible to realize special advantages by interweaving different combinations of these enhancements.

The design principle as claimed in Claim 1 makes it possible to achieve the desired improvements, especially in the case of slope-support walls and incline-support walls, even in the case of structures for slopes and inclines with backfill materials that create a comparatively high foundation pressure but have little stability or load-bearing capacity on their own. The anchoring devices that are provided here that take up overturning moment have especially good immanent stability and steadiness in the structure composite.

The design principle as claimed in Claim 9 makes it possible to achieve the desired improvements, especially in the case of slope-support walls and incline-support walls, even with structures for slopes and inclines that have backfill materials of poor overall quality. Decisive in this regard are anchoring devices with rigid anchoring elements, preferably designed as concrete structures, that are arranged one after the other in the direction from the supporting structure into the compound filler and are connected to one another as well as to the supporting structure in such a way as to allow the transfer of tensile forces. Each of the chain arrangements designed in this way, whereby each has a plurality of anchoring elements, has considerably improved anchoring stability and tensile strength even inside comparatively poor filler material. In addition, the fact that the filler material is interspersed with the anchoring elements in an arrangement like a chain, in conjunction with the foundation pressure that is produced in each case, also tends to ensure relative strengthening of the filler material itself. Overall this produces surprisingly high tensile forces that are distributed over the front surface of the supporting structure, ensure a high degree of stabilization, and brace the supporting structure against the foundation pressure.

In addition, the total mass of the supporting structure, together with the weight of the anchoring device with the compound filler, tends to stabilize the support wall like a gravity retaining wall. This means a considerably reduced smaller overall thickness than could be achieved with conventional anchoring elements or with anchoring devices with flat material alone.

This considerably smaller overall thickness of the overall structure thus makes it possible to construct a gravity retaining wall even on steep terrain where otherwise excessive excavation would be required for conventional anchoring elements, which are much longer, or for anchoring with flat material. The design as claimed in the invention with the anchoring elements arranged like a chain thus turns an anchored wall into a gravity retaining wall. This ensures a qualitatively new level of applicability and greater cost-efficiency.

The design principle as claimed in Claim 13 with its anchoring devices, which have soft-flexible flat material (in practice frequently referred to inaccurately as "geotextile"), achieves the desired improvement and the accomplishment of the object of the invention by significantly improving the transfer of forces and the bonding stability between the soft-flexible flat material and the supporting structure, which generally consists of concrete elements. The gap that is formed here in each case between a connection element of a supporting element of the front-forming supporting structure and a corresponding anchoring flat-material strip is at least partially filled with material of the compound filler, especially granulate or bulk material, such that at least a portion of the material that fills this gap transfers tensile forces from the flat-material strip to the supporting structure in the form of compressive forces. This ensures not just that concentrations of stress in the soft-flexible flat material are compensated for and corresponding damage to the latter is avoided, but also that the long-term danger of breakdown of the flat material caused by it coming too close or making even contact with the alkaline concrete of the supporting structure is avoided. Overall improved stability of the anchorage and thus of the entire structure is the result.

The invention and enhancements thereto are explained below with the aid of sample embodiments that are presented in diagrammatic form in the drawings.

FIG. 1 shows the cross-section of a slope supporting structure. Said structure comprises an essentially rigid supporting structure designed as a projection that has a plurality of support elements arranged one above the other in tiers (E). A compound filler (MF) consists at least

partially of bonding-agent-free granulate material and/or bulk material and/or soil material. The supporting structure is connected to solid anchoring devices (AV1, AV1a) that extend into the compound filler, are designed to receive overturning moment, and are designed to be resistant to bending at least in sections within an area that extends in the compound filler (MF). Said anchoring devices are connected to the corresponding wall supporting structure (TK1) that forms the front in such a way as to transfer moment. Likewise, the anchoring elements that are associated in each case with a desk (E) and are preferably designed as concrete structures are arranged one after the other in the direction toward the interior of the compound filler (MF) and are connected together in sets in such a way as to transfer moment. To accomplish this, within the transfer of moment in each case between an anchoring element (AE1), on the one hand, and at least one adjacent anchoring element or the supporting structure (TK1), on the other, there are at least one tensile-force-transfer element (ZE) and at least one pressure-transfer element (DB).

It has been established that an especially advanced structure is one in which within the transfer of moment between at least one anchoring element (AE1), on the one hand, and at least one adjacent anchoring element or the supporting structure (TK1), on the other, there are at least one tensile-force-transfer element (ZE) and at least one area that is arranged relative to its axis of action (XX) with a gap under the tensile-force-transfer element and that acts as a pressure-transfer element (DB) at the respective anchoring element or the supporting structure (TK1). Moreover, support surfaces (AF) that are associated in each case with a tier (E) of the supporting structure (TK1) are arranged transverse to the resulting weight pressure.

It is also especially expedient to have connections (VZ) that are located in each case between at least partially overlapping anchoring devices or anchoring elements, whereby said connections snugly transfer thrust stresses and are designed, in particular, like gear wheels.

FIG. 2, in turn, shows a cross-sectional view of a slope-supporting structure and/or noise-barrier structure with the following features: the structure comprises at least one essentially rigid supporting structure TK2 that is designed as a projection and has a plurality of support elements

arranged one above the other in tiers (E), as well as at least one compound filler MF that consists at least partially of bonding-agent-free granulate material and/or bulk material and/or soil material. The supporting structure is connected to a plurality of anchoring devices (AV2) that extend into the compound filler. An anchoring device (AV2) comprises a plurality of anchoring elements (AE2) that are designed as, e.g., concrete structures, are arranged one after the other in the direction toward the interior of the compound filler (MF), and are connected together in such a way as to transfer moment. This ensures the strengthening of the compound filler, as already generally explained above, and a bracing of tensile forces that act on the front-forming supporting structure, whereby said forces are distributed over a large area ????.

In an advanced design, the anchoring elements (AE2) can be connected to each other/to the supporting structure in such a way as to be able to swivel and/or to move laterally. To ensure swiveling capability, FIGS. 3 and 4 show a side view and a top view of an anchoring element with a T-profile. A bow-like tensile element ZE is attached with its angled end segments in such a way as to be able to swivel but is snugly secured in the frame segments of the adjacent anchoring elements. Appropriate play in the bearings and optionally a certain amount of deformability of the long segment between the bow and the apex also allows for a sometimes desirable transverse mobility and even the ability to swivel transversely.

By contrast, FIG. 5 shows a top view of an anchoring element (AE2a) with a U-profile and two bow-shaped tensile elements ZE that extend with their angled end segments on both sides into the frame segments of the section. This allows the anchoring elements (AE2a) to swivel parallel to the planes of the frames, while at the same time they are basically prevented from swiveling at right angles thereto.

FIG. 6 shows an essentially rigid supporting structure (TK1) that is designed as a projection and has a plurality of support elements arranged one above the other in tiers (E), as well as at least one compound filler that consists at least partially of bonding-agent-free granulate material and/or bulk material and/or soil material. The part of the structure with the supporting

structure (TK1) that is provided as a foundation corresponds to the representation in FIG. 1, so no further description is required here.

The superstructure comprises a supporting structure (TK3) with a plurality of anchoring devices that extend into the compound filler, preferably with a large plurality of such anchoring devices, which in each case have several soft-flexible flat-material strips (FB) that extend into the compound filler. At least in certain sections, said strips are arranged around a connecting element (ASL) that is provided with a gap (AB) at the supporting structure (TK3), and said gap is at least partially filled with the material of the compound filler, especially granulate or bulk material, in such a way that at least a part of the material that fills this gap (AB) transfers tensile forces from the flat-material strip (FB) to the supporting structure.

The arrangement shown here of a first part of a structure with solid anchoring devices as an underlying foundation structure and a second part of the structure with flat-material anchoring devices as a superstructure located above it increases the stability of the compound filler and thus promotes the formation and transfer of support moments owing to the increased vertical load. With regard to strengthening of the structure and the supporting transfer of tensile forces, the same is true of a foundation with a structure in accordance with FIG. 2 and Claim 9.

Moreover, FIG. 6 shows the bow-like path of the flat-material strips (FB) through an opening in a frame-like element (ER) of the supporting structure (TK3) of the flat material with a minimal gap (BC) between the flat material and the supporting structure in order to keep the flat material from coming too close to or even touching the concrete of the supporting structure. This arrangement of the chemically sensitive flat material makes it possible to create a non-positive connection between the flat material and the supporting structure without direct contact. A separate conventional-type covering of roofing paper or similar material which, in addition to the extra expense, would bring about an undesirable reduction in friction and thus impair the frictional connection is unnecessary. Moreover, such a flat-material loop with its material filler

acts as a cushioning element for transmitting compressive forces. In addition, the figure shows a guide that has two layers in certain sections (ZLF) for the flat material strips (FB).

It should also be pointed out that the use of structures according to the invention with flat-material supporting structures and compound-filler cushioning elements in accordance with Claim 13 is in no way restricted to combinations according to FIGS. 6 and 7 and 8.

FIG. 7 shows in turn a cross-section of a wall-like combination structure with a foundation and superstructure. Here, however, a superstructure in accordance with FIG. 2 is implemented in connection with a flat-material foundation and supporting structure TK3 in accordance with the superstructure shown in FIG. 6. The supporting anchoring effect and force transfer accomplished by the flat-material strips to the front-forming supporting structure TK3 are considerably further enhanced here by the vertical loading on the part of the superstructure.

The same thing also is true of the embodiment according to FIG. 8, in which a superstructure according to FIG. 1 and Claim 1 and a flat-material foundation with a supporting structure (TK3) are combined.